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ABSTRACT

The Internet is a network of networks which continually accumulates and amasses information, much of which is without organization and evaluation. This study addresses the need for establishing a database of Uniform Resource Locators (URLs), and for collecting, organizing, indexing, and publishing catalogs of URLs. Librarians and information professionals were asked via a World Wide Web survey to list and evaluate the URLs they most frequently use to fill information needs for their information-seeking communities. The survey achieved a response rate of 86.4% (n=70). Librarians and information professionals are incorporating URLs into the repertoire of sources they use to provide information. Projects involving construction of catalogs of URLs designed by librarians and information professionals are in the formative stages, with 44.4% of study participants having an informal collection of URLs maintained by bookmarking. The need for a listing of URLs is affirmed by the fact that 80% of participants requested a listing of the URLs resulting from the study. Appendices include the cover letter, survey, and a listing of URLs frequently accessed by surveyed librarians. (Contains 19 references.) (Author/SWC)

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UNIFORM RESOURCE LOCATORS (URLs): POWERFUL REFERENCE TOOLS FOR LIBRARIANS AND INFORMATION PROFESSIONALS

A Master's Research Paper submitted to the
Kent State University School of Library Science
in partial fulfillment of the requirements
for the degree Master of Library Science

by

Teresa S. Smith

May 1996

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ABSTRACT

The Internet is a network of networks which continually accumulates and amasses information. Much of this information is without organization and evaluation. This study provides data collected from librarians and information professionals who were asked via a World Wide Web survey to quantify the Uniform Resource Locators (URLs) they are currently addressing to fill information needs for their information seeking communities. The major findings of this research indicate that librarians and information professionals are incorporating URLs into the reportoire of sources that they use to provide information. A listing of URLs that are especially reliable because of their content and usefulness is provided. As the stability of URLs on the Internet is unpredictable, however, this listing of URLs serves only as a trend indicator, providing possibilities of exempliary applications of URLs use for reference. The need for establishing a databank of URLs, and for collecting, organizing, indexing, and publishing catalogs of URLs is addressed; interpretation of data concludes that projects involving construction of catalogs of URLs designed by librarians and information professionals are in the formative stages.

As this study is to continue, a web page has been constructed to collect and update information purtinent to this research. Samplings of the data collected are available on the web page at http://ourworld.compuserve.com/homepages/urlsurvey.

Masters Research Paper by

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CHAPTER I

INTRODUCTION

As the quantity of information on the Internet grows at an accelerating rate, the search for worthwhile Uniform Resource Locator's (URL's) on the World Wide Web becomes increasingly more important for library and information professionals. Of significant importance also, is the fact that, although the information is voluminous, much of it is without organization and documentation. While a random collection of data is of notable value in a survey, a random accumulation of knowledge on the Internet may or may not be particularly beneficial to the information professional. Reviews by Basu (1995), Diaz (1995), Lanier (1995), Tuss (1995), and Healey (1995), are currently pointing to the fact that information professionals do use the Internet for reference, but in reviewing the literature, studies that include evaluations of URL sites are not easily assimilated. Looking to other disciplines for their assessment of the situation, statements like that of John Dodge (1995), Senior Executive Editor of PC Week, ring familiar. He compares the Web to a young exploding galaxy that is still forming. He advises that very little about this exploding young galaxy has hardened. As this information does "harden," information seekers read about free information on the Internet and come to the information industry for help in untangling this net of knowledge.

The documentation of a databank of selective URLs is a legitimate initiative. In business, as well as in government and academia, time is money; time does not lend itself to endlessly searching the Internet to find something that may be suitable for reference, or for business inquiries. The need for this study is founded upon the realization that even though some URLs may eventually become invaluable or nonexistent, a declared bank of https (hypertext transfer protocols) to examine from time to time would be useful for information specialists as well as the customers and clients of information specialists. Eric Lease Morgan, NCSU systems librarian, writes:

> Libraries are about collecting, organizing, archiving, disseminating, and sometimes evaluating information resources. Libraries are not just about books and journals; books and journals are only one manifestation of the information universe. Doesn't it makes sense that librarians should be involved in providing Internet resources? Users often complain about the disorganization of the Internet. Librarians have been organizing information resources for centuries. Scholars worry about the long-term preservation of electronic information. Archiving information is a major aspect of librarianship. Some say the internet has a high "noise to signal" ratio. This is true for the information universe in general, and librarians have special skills when it comes to extracting information from data. In short, I advocate the creation and maintenance of Web servers and other Internet resources by librarians. Although this requires the development of new skills, librarians already possess the more critical skills necessary to make these Internet services truly useful, and, while there are some risks involved in this effort, these risks are well worth taking. (Morgan 1994. 9)

Isolating and evaluating the URLs that provide reliable information with content relevant to the information needs of the information seeking community is a task well suited for librarians and information professionals. William Katz's Introduction to Reference Sources (1992) outlines standards for reference librarians

to apply when evaluating reference sources. These considerations relate to cost, purpose, authority, scope, audience, and format. The same considerations are applicable to the evaluation of Internet resources such as URLs; however, until the Internet resources are more stable it may be worthwhile to evaluate them generally according to content and quality. As they do become validated librarians may define additional definitive methods of determining whether or not URLs are of the quality necessary to use in answering reference queries.

Tillman (1996) takes a pragmatic view of quality on the Internet. At the very least, the facts should be accurate, as well as current, and the bias and authority of authors should be made clear. She provides generic criteria for evaluating information found on the Internet:

Stated criteria for inclusion of information

Authority of author or creator

Comparability with related sources

Comparability of information

Appropriateness of format

Software/hardware/multimedia requirements

A background of the survey requires some basic understanding of Internet terminology, and although information professionals are well versed in this area, definitions are provided here for people who are inexperienced in searching the Internet for specific content in the form of Uniform Resource Locators (URLs).

The Internet is a worldwide collection of interconnected networks, ranging from

large networks, such as the National Science Foundation Network (NSFnet), to medium-sized networks such as the New York State Education and Research Network (NYSERNet), to small local area networks (LANs) found on most university campuses and throughout many commercial firms and public institutions. It is a network of computer networks; a project that was developed by the US Department of Defense and then taken over by the US National Science Foundation. Today it is providing research and data access to essentially everyone with a computer and basic telecommunications hardware and software.

The World Wide Web is an Internet tool that uses hypertext links to connect with other resources, and, according to Philip Davis (1995), it is the most flexible and intuitive way to navigate on the Information Superhighway. According to this report, Davis explains that the WWW originating at the European Center for Particle Physics (CERN) Laboratory in Geneva, Switzerland, was conceived in 1989 by Tim Berners-Lee as a hypertext-based system to facilitate world wide information sharing among the physics community. The idea behind the WWW is that everyone, irrespective of computer platform (DOS, Macintosh, or Unix), should be able to access information on the network. In 1991 it became available for the rest of the Internet community. Its popularity is due largely to its simplicity and its ability to assimilate data from almost any source easily, thus making it an excellent front end to the Internet. It is unique from all other Internet resources in that is supports multimedia. In a hypertext system such as this one, a document has "links" to other documents. The links are connected by a client/server

information system; the client and the server communicate with each other through these https (or URLs). If the complexities are difficult to understand think of it as presented by Morgan (1995). He suggests it's a lot like going to a French restaurant. At the restaurant, you (the user) are presented with a menu of choices given to you by the waiter (the client). After making your selections, the waiter takes note of your choices, translates them into French, and presents them to the French chef (the server) in the kitchen. After the chef prepares your meal, the waiter returns with the your dinner (the results). These links, (the waiter), are known as Uniform Resource Locators (URL's), or http addresses, which are the subject of this survey.

Uniform Resource Locators (URLs), or http addresses, are simply address systems for World Wide Web resources. (Http stands for Hypertext Transfer Protocol.) They are used to briefly describe and identify the protocol used by, and the location of, Internet resources. Morgan equally well describes the format for the URL:

> In general, a URL has the following protocol://host/path/file. "Protocol" denotes the type of Internet resource; for example the most common are gopher, wais, ftp, telnet, http, and mailto (electronic mail). " Host" indicates the name or IP (Internet Protocol) address of the remote computer. For example 152.1.39.42 or www.lib.ncsu.edu.is an address. "Path" is a directory or subdirectory on a remote computer, and " File" is the name of the file you want to access. (Morgan 1994, 9)

A URL, then, describes the personality and whereabouts of any type of resource.

Through the URL, the web can interact with http documents, gophers, WAIS databases, ftp sites, telnet sessions, computer files, and e-mail functions. Knowing the URL in advance allows an information seeker to go directly to that URL without paging through web links to get there, and herein lies the need for the indexing, organizing, or cataloging, of URLs. In summation, then, URLs describe the location of Internet resources. They are part and parcel of the WWW, which is a client/server information system, consisting of two separate programs, client and server; client and server communicating with each other using hypertext.

The implications of the development of this network of networks are colossal. As documents are linked together in this hypermedia environment, the world's information resources can be shared. Contemplation from Scott Mutter's (1992) billboard is germane; a culture and what it produces is made possible and is reflective of the knowledge that underlies it. It is an unprecedented, monumentally unique opportunity for librarians.

Purpose of the Study

This study purposes to assess trends that are developing as librarians and information professionals locate and evaluate specific World Wide Web sites on the Internet that can be used as quantified sources of reference material. It is an examination of how uniform resource locators (URLs) are fulfilling information needs in public, special, and academic library environments.

Operational Definitions

Accelerating (rate of internet growth)

At this point the "accelerating" in reference to growth of the Internet, is a concept that can be operationalized. Datamation's "Web Watch" (1995) credits outgoing chair of the Internet Architecture Board ,Christian Huitema, with a prediction that by 2020 there will be 1 trillion nodes on the Internet. Davis (1995) reports that the web is undergoing unequaled success; in 1993 it grew by 350,000 percent. By March 1994 at least 100,000 pieces of information located on 26,000 computers were accessible to the millions who use it. In May alone, 800GB of information - the equivalent of 2,300 Encyclopedia Britannicas - traveled over the Web. As of June, there were more than 7,000 WWW servers on the Internet, and, according to current reviews, about thirty to ninety new servers are added daily.

URL

URL (Uniform Resource Locator) is an address system for World-Wide Web resources.

Librarian

For this paper, the term librarian is interchangeable with information professional, and information specialist.

E-Conference

E-Conference is the term often used for e-mail communications. Terms synonymously used for "e-conference" may be "discussion groups," "listservs," and "electronic forums." E-conferences responding to request for information for this

research include following:

E-Conference	Topic Information
BUSLIB-L	Discussion forum for issues related to business librarians
LAW-LIB	Discussion of law-related issues
LIBREF-L	Discussion of Reference Issues
MEDLIB-L	E-conference for medical and health sciences librarians
GOVDOC-L	Discussion of government documents issues
PUBLIB	General issues of discussion in public libraries
STUMPERS-L	Networking resource for reference questions that have people stumped!
CALIBK12	Issues relating to California K-12 Librarians

Limitations of the Study

This study is limited to responses from librarians, information professionals, and library paraprofessionals in special, public, and academic environments who participate in at least one of the following e-conferences: BUSLIB-L, LIBREF-L, MEDLIB-L, GOVDOC-L, LAW-LIB , PUBLIB, STUMPERS-L, AND CALIBK12. These c-conferences are primarily concerned with library related issues and they were selected because of high distribution rates.

CHAPTER II

LITERATURE REVIEW

A background of studies indicate that Internet resources can offer significant amounts of information. Ladner and Tillman(1993) report that librarians are, in fact, reinventing themselves with the Internet. Of prime importance they report, is the human connection provided by discussion groups and e-conferences. Much of the data here is dedicated to special librarians use of the Internet for reference via discussion groups and e-conferences. Of notable mention, however, is the fact that information professionals use catalogs on the Internet for ready reference, for citation checking, for collection development, and for technical services. They access remote computer systems on the Internet to search OPACs for some of the traditional tasks such as checking availability status before requesting an interlibrary loan, to verify citations, and to answer reference questions. In summation, according to this report the Internet is changing the way in which reference librarians and information specialists serve their clientele. Problems do exist in resource documentation and training. Basu (1995) reported that Internet use by reference librarians is severely limited by their expertise and training, and by the nature of information and its structure on the Internet itself. This article reports that most librarians responding to a recent survey said they lack the time and resources to adequately develop Internet searching skills, limiting its usefulness to them. Many, however, do use it for electronic mail, specific subject

searches, and for searching online catalogs. According to Basu's study, the availability of the vast amount of resources on the Internet has made reference work more challenging. Practicing reference librarians feel that without some kind of structure and organization, retrieving pertinent information is becoming extremely difficult and time consuming. Basu reiterates as one author has suggested, that there is a lot of useful information floating around on the Internet, and that without organization and structure it will get lost. In Basu's study, eight librarians said that they found the answers between 21 and 30 percent of the time, and only four said that they found the information they needed more than 50 percent of the time.

Bane (1995) says that the Internet is a large and increasingly critical resource for academics and professionals. This Bane study concluded with the concept that the Internet is a popular method for academics with computer experience to "do business." That business is primarily communication among individuals or discussion groups using e-mail. According to Bane, they tend to Gopher through the Internet for database access and to transfer files from popular sites.

Jim English (1995) likens URLs on the Internet to hidden information packets presented by Gopher. He says both methods posses complete and unique references to enable any browser to locate information anywhere on the Internet.

Morris (1995) points out that law librarians are using the web at the reference desk with impressive examples of law library web servers that are intended to be used as reference tools; Washburn University School of Law has two mounted

servers, Reflaw and Doclaw. Reflaw is a virtual law library reference desk; Doclaw is a server that connects with various government documents and information sources. Libraries in all categories, special, academic, and public, are finding the web useful for reference service, and are endorsing each other's web resources. As Morris reinforces, the potential payoff of finding "treasures" that will increase the world's knowledge is great. He says the web offers so much information in so many areas with so much potential benefit for your library and customers, that not exploring the web would be a disservice to everyone involved. This is an information source that seems custom built for the demands of a library, so librarians and information specialists are exploring it, learning it, and using it to serve information needs.

Significant problems with the identification of high content URLs are pointed out by Healey (1995) in his article about untangling the web. Users have no control over what resources will continue to be available; so one could readily surmise that disaster could emanate from a web dependent library. Bruce, Lennon, and Nelson (1995) also talk about some of the problems with documenting material on the Internet; they point out that Internet addresses have a short life, some not even staying around long enough to be evaluated. Http addresses change, sites become inaccessible and the network itself becomes overloaded at certain times of the day. The most important problem, they suggest, lies in the fact that there is little control over contributors or currency of information. So the question is asked, how sure

can information seekers be that the resources are definitive, current, or indeed accurate?

In the final analysis, Tillman and Ladner (1992) reviewed the literature in this area and advised special librarians to join the world of electronic networking via the Internet. Their survey confirmed that special librarians were among the "early adopters" using the Internet, and the responses they had illustrated many of the benefits Internet access can provide to librarians. A review of the Ladner and Tillman study by Joan Tuss (1994) concludes with this summary:

> All information professionals should.....,learn about the internet, and apply it to their work. We must become familiar with the internet if we are to keep our profession alive into the next century. (Tuss 1994, 18)

CHAPTER III

METHODOLOGY

A survey was used to collect information relevant to the URLs on the Internet. It was specifically designed to find out how information professionals are using the World Wide Web for reference. The questions were selected to test whether or not librarians and information professionals are using Uniform Resource Locators for reference, and to determine which of these Uniform Resource Locators are applicable in filling the information needs of information seekers. (see Appendix B)

Participants in the survey were primarily librarians and information specialists that are presently taking part in the following listservs: BUSLIB-L, LAW-LIB, LIBREF-L, MEDLIB-L, GOVDOC-L, PUBLIB, STUMPERS-L and CALIBK12.. These e-conferences were selected because their listowners have indicated that they are related to topics in library and information science, and because of their relatively high distribution rates. Since these participants were already involved in Internet discussion groups, they were more likely to have knowledge of Internet searching, and they are more likely to be familiar with various information seeking strategies. A call to participate was distributed in the form of a cover letter explaining the objectives and test goals of this research paper with a questionnaire that was coded to execute an attached file which contained all of the questions in the survey. Recipients who wished to participate were invited to execute the

attached file, complete the survey, and return the form by e-mail. The format of this questionnaire was redesigned, as it became apparent that some software packages automatically opened an executable file. After e-mailing some forms back in ASCII text, a more suitable method of gathering information was then adopted for this data collection, in the form of a page on the World Wide Web. This means of data collection proved to lend itself effectively to the study, since the research already involved selection of World Wide Web sites for library reference. Of the 10 e-conferences that received a call for participation, 81 librarians or library paraprofessionals indicated they were willing to participate in the survey either by requesting that a survey form be sent to their e-mail, or by executing and returning file that was attached to their cover letter. Of the requests received by e-mail 11 responses were not returned. The number 81 is the figure used to identify the total number of participants for this survey. Of the total 81 participants, 70 returned a completed form and were counted, providing an 86.4% response rate for this study. The 70 respondents returning the completed questionnaire provide approximately 120 URLs that are frequently used by librarians and information professionals. These URLs have been listed in Chapter IV of this study for reference purposes; however, due to the instability of the Internet at this point in time, they are viewed only as trend indicators suggesting "families" of http addresses that often provide reference information for librarians. A web page reflecting continuous update of these web sites has been implemented for continuing research and reference.

The survey forms from the executable file, the World Wide Web page, and the

basic ASCII formats were returned via e-mail, sorted, and cross- correlated with a software package. Finally, each response was analyzed as an individual question, and interrelated to other questions in the survey. The results were tabulated and organized by the questions that were asked; an analysis of the data follows in Chapter IV.

CHAPTER IV

ANALYSIS OF DATA

This study was designed to determine how information Uniform Resource Locators (URLs) on the Internet are filling information needs for librarians and information professionals. Specifically, addresses of URLs that are frequently used for reference were investigated. A list of the most frequently used URLs is provided in Appendix C with a quantitative evaluation; these evaluations were submitted by at least one respondent from information industry. (Due to the dynamics of the ever changing World Wide Web, this list has been attached in an appendix so that Web content and http addresses can be updated frequently without effecting the major elements of this research paper). As one evaluation is an indication that the URL is important to at least one respondent, a more significant finding may be derived from applying a standard deviation to URLs with significant numbers to use the standard deviation process. Five of those URLs were submitted by more than one participant, providing enough results to apply standard deviation.

Table 1.

Standard Deviation Applied to Five URLs

URL	Responses	Content Mean	Content Stand'Dev'	Quality Mean	Quality Stand'Dev'
Alta Vista	16	4.3125	0.6020	4.0625	0.6800
Lycos	11	4.5500	0.5200	4.3600	0.6740
Yahoo	11	4.2700	0.7800	4.0000	0.7745
WebCrawl	6	4.5000	0.8940	3.6600	1.0327
Thornplus	5	4.6000	0.5478	4.4000	0.5478

Further, the research was designed to find out why these specified URLs are used frequently for reference. The questions on the survey were designed to interrelate, and to empower readers of the study to make predictions about the current application of URLs to reference work in libraries and information resource centers.

Generalities of opinion, interpreted by extraneous data submitted in the comments box of the survey, acknowledge the fact that although information published by the press would lead one to believe that everyone, especially library personnel, is a prolific user of web resources, the fact is that many of the persons who were asked to participate in this study, did not have access to appropriate tools like a web browser, or even a personal computer at this point in time, even though they were a part of the library environment. Many recipients of the survey asked for a copy of the summarized study upon its completion responding that they would begin training in the near future, and that this study would provide information that would be useful as they begin to address the web for reference; at this point however, they could not submit a response because of their lack of access to the web. A number of libraries that were visited or contacted by phone were just placing Internet classes training on their calendars. It is important to recognize that this new technology is in its puberty; that the World Wide Web information is

organized, indexed, and cataloged by information professionals who are actively serving their library communities. The survey results follow, organized by questions asked.

The first five queries were designed to characterize personnel involved in the study, and to qualify the respondents as an integral part of the information industry. The largest number of survey respondents, 38.57%, work in academic libraries, followed by 24.29% working in public libraries, 28.57% in special libraries, and 8.57% in other scenarios.

Table 2.

Libraries

Library	f	%
Academic Library	27	38.57
Public Library	17	24.29
Special Library	20	28.57
Other	6	8.57
Totals	70	100.00

In relating job description of library personnel to URL use, questions were asked about whether or not the participants had received an M.L.S., and about their positions in the library. The findings indicate that 80.00% of the respondents have received and M.L.S. degree, and 8.57% of the respondents have not received an M.L.S. degree. Other persons from the library environment responding to the

survey include 11.43%. Table 2 shows that 17.14% of the respondents are library managers or directors, 64.28% as librarians or information specialists, 7.14% as reference assistants or technicians, and other respondents including 11.43%; most of these classified themselves as group leaders or section supervisors.

Table 3.

Job Titles

Job Title	f	%
Library manager/Director	12	17.14
Librarian/Information Specialist	45	64.29
Reference Assistant/ Technician	5	7.14
Other	8	11.43
Totals	70	100.00

The table suggests that as a whole, library paraprofessionals are not using the World Wide Web for reference. This could be due to a number of factors, including lack of hardware or software, or the mere fact that it is not encompassed in their job descriptions. This interpretation was checked by telephone conversations with library personnel who responded that their professional staff is presently using the World Wide Web, and that additional training was to be scheduled for the paraprofessional librarians.

The subject specialty of participants was of consideration in this research as it was necessary to identify the URLs that were especially suited for particular needs

of particular subject specialists.

Table 4.

Subject Specialities

Subject Specialty	f	%
Science/Math/Technology	19	30.00
Business/Finance	6	8.57
Medicine/Health	4	5.71
Social/Behavioral science	10	14.29
Humanities/Art	5	7.14
Government/Law	8	11.43
General	16	22.86
Totals	70	100.00

Table 4 shows that 30.00% of the participants classify themselves as science/math/technology subject specialists, while 8.57% list themselves in business/finance; 5.71% were under the medicine/health discipline, 14.29% were under the social/behavioral sciences category, 7.14% are under humanities/arts, 11.43% are under government/law, and the remaining 22.86% classify themselves as working in all of the subject areas, covered for this study by the term "general." The science/math/technology librarians make up the greater percentage of the participants here. When asked to identify URLs used for reference, the humanities/art librarians and the law/government librarians tended to identify

specific URLs that they address daily. For example, one respondent replied, " I have specific sites that I check each morning; I always check for new legislation and for new patents that have been issued by our competitors." Librarians from this category tend to know where they want to go on the Web, and to go directly to those sites, while other area specialists who may deal with more generic questions tend to go to the search engines for reference. (Reference question 8,9, and 11)

The breakdown of information about the value of data found on the Internet was found to be at least somewhat worthwhile by all of the participants.

Table 5.

" Net" Value of URLs

Value of Data	f	%
Not Worthwhile	0	00.00
Somewhat Worthwhile	17	24.29
Worthwhile	21	30.00
Very Worthwhile	20	28.57
Extremely Worthwhile	12	17.14
Totals	70	100.00

More participants found the information to be "worthwhile." Even at this early stage of development, 80% of the participants found the information to be at a minimum " worthwhile," which is an excellent prediction of the direction in which this technology is heading. It is notable that 24.29% of the respondents found the

information to be at least "somewhat worthwhile," 30.00% thought the information was "worthwhile," 28.57% of the participants considered the sites they submitted to be " very worthwhile," and 17.14% found the data to be "extremely worthwhile."

The amount of time that participants spend on the Internet per week varies from two hours or less to more than eight hours.

Table 6.

Time Allotted for Searching World Wide Web (per week)

Hours	f	%
two hours or less	2	2.88
more than two hours but less than four hours	9	12.85
more than four hours but less than six hours	12	17.14
more than six hours but less than eight hours	14	20.00
more than eight hours	33	47.13
Totals	70	100.00

Two hours or less are spent by 2.88% of the respondents, more than two hours but less than four hours are spent by 12.85% of the participants, more than four hours but less than six hours are spent by 17.14% of the participants, more than six hours but less than eight hours are spent by 20.00%, and finally, librarians who spend more than eight hours per week on the Web were 47.13% of the total librarians participating in the survey. The Web, then, is used at least one day out

of five by close to 50% of the librarians completing the survey.

Respondents were asked to list three URLs that they most often used for reference on the Internet. (See Appendix C) This question, number 8 on the survey, along with the question that addressed number of personnel in the library, number 4 on the survey, was designed to consider the fact that information professionals often share resources, and they may pull from the same URL addresses, particularly if they have created a home page for their work environments. Responses tended to fall into a natural classification system that, for this research, will be called "families" of Web addresses. These categories, or "families," of URLs hinged on site selections located by information professionals searching for information necessary for their reference work. For example, one "family" of URLs created by responses from survey participants is that of Libraries. These library related homepages are of a dual nature; one designed for Intranet use, the other designed for World Wide Web publication. Additionally "families" of Government Sites, Search Engines, and Commercial Ventures fell along natural lines of distribution. The responses, then, fell into four basic categories: library sites, government sites, search engines, and commercial ventures. The http addresses (URLs) that were listed by library personnel, and that have been used for this research as trend indicators are as listed in Appendix C; Appendix C also includes the quantitative evaluations of each URLs.

One of the problems with evaluating URLs lies in the fact that URL addresses frequently go out of existence or change web address. In order to take this fact

under consideration information professionals were asked to indicate the length of time they had been searching the URLs they had cited for this survey. The length of time librarians have been using URLs is an indicator of the encroachment of Web searching into the mainstream of library tools that are used for reference.

Table 7.

Aggregate Time Using URLs

Time	f	%
three months or less	9	12.86
more than three months but less than six months	12	17.14
more than one year but less than two years	18	25.71
more than one year but less than two years	19	27.14
more than two years	12	17.14
Totals	70	100.00

At least 50% of the URLs submitted for this study have been used for reference for more than one year. Considering the fact that the tools for browsing the Web have been in existence for around three years, the URLs that have been evaluated may be considered reliable. Indications are that these URLs are gaining stability, and will be less subject to spontaneous evaporation from their Web addresses. Information professionals who have been using the URLs for three months or less

amounted to 12.86%, Librarians using the URLs more than three months but less than six months amounted to 17.14%, those using the URLs more than one year but less than two years were 25.71%, more than one year but less than two years were 27.14%, and more than two years 17.14%.

To make a prediction about how librarians and information professionals are becoming involved in the classification and documentation of URLs, whether by indexing, or cataloging and publishing, a question was included in the survey to determine the efforts that have been made in this endeavor.

Table 8.

Length of Time Before URL Collection Will Be Operational

Time	f	%
within three months	31	44.28
within six months	7	10.00
within one year	9	12.86
not planning to maintain a collection of URLs	23	32.86
Totals	70	100.00

The content of Table 8 provides data that suggests that information professionals are rapidly becoming involved in the organization of a collection of URLs. Of those participating in the survey, 65.71% are organizing a collection of high use URLs, and only 34.29% say they have no plans to organize a collection of high use URLs at all. Of those participants who are organizing a collection of URLs

44.28% say they have an operational collection of URLs that is maintained by simply bookmarking or by internal home pages. Participants whose collections that will be operational within six months is 10.00%, within one year are 12.86%, and 32.86% are not planning to develop a collection of high use URLs.

CHAPTER V

SUMMARY AND CONCLUSIONS

The major findings of this research indicate that librarians and information professionals are filling information needs with information found on the Internet via Uniform Resource Locators (URLs) on the World Wide Web. Specific URL addresses have been identified as trend indicators, and classified according to URL "families" established by this data. The "families" fall naturally into categories: library sites, government sites, search engines, and commercial ventures. Search engines designed to look into multiple databases and retrieve pertinent information were, in this study, the most frequently cited URLs as information professionals provided data relating to the sources of URLs that they used for reference.

It is important to recognize the fact that participants who were unable to provide specific data for this research because of their lack of equipment indicated that the information collected by this study would be useful as they do gain access to the software and hardware necessary for browsing the Web. The fact that 80% of the participants requested a listing of https resulting from this study is evidence that there is a definitive need for this kind of data.

The information accumulated in this report indicates that librarians from the science/mathematics/technology and the "general" fields tend to go directly to one of the search engines to find the data they need for reference. Information

professionals who are in other disciplines that were tested, business/finance, medicine/health, social/behavioral science, humanities/art, and government/law, tend to go to specific URL sites that they have identified for their own particular use. These sites are book marked for easy reference; 44.40% of the participant say they have an operational collection of URLs maintained simply by bookmarking. As pointed out in the introduction of this research by Morgan, Tillman, Ladner, and Morris, librarians are well suited to become organizers of information on the Internet. This research indicates that information professionals are doing just that. They are becoming involved in the classification of URLs on the World Wide Web of the Internet for their own use, for the use of their colleagues, and for the use of their information seeking communities.

This technology may be likened to the invention of the printing press in that it increases the availability of information in the 1990 's in much the same way as Gutenberg's printing press increased accessibility to information in the 1400's. When the printing press became available, the public had more accessibility to printed information. Likewise, when the World Wide Web came into existence, information seekers immediately had more access to the electronic information. In both scenarios mans' access to knowledge increased dramatically.

Enthusiastic responses such as the following indicate that efforts to quantify URLs will make a positive contribution to the field of information science. One respondent contributed, "I applaud your efforts to quantify URL use and reliance by information professionals. I use federal government URLs with great frequency

and strongly support government maintenance of these sites. I believe your efforts might help to justify these expenditures by the Feds."

APPENDIX A

Re: Uniform Resource Locators (URLs): Powerful Reference Tools for Librarians and Information Professionals

February 5, 1996

URL Survey Participant:

The following is a survey of people in the information industry who participate in e-conferences, and who use Uniform Resource Locators (URLs) for reference. This study will attempt to find out how significantly Uniform Resource Locators, also called URLs or http address systems, are filling information needs. Additionally, this study will identify URLs that are especially reliable because of their content and usefulness. We will look at the number of participants, their institutional affiliation, their fields of study, and identify their most frequently used URLs; we will test whether or not information professionals are organizing a collection of high use URLs.

Your participation is important to the survey, and your response will be kept confidential; only summary data will be released upon request. There is no penalty of any kind if you should choose to not participate in this study, or if you would withdraw from participation at any time. The survey is designed for participants who are over the age of twenty-one; no risks, however, are involved beyond those normally encountered in everyday life.

If you want to know more about this research project, please feel free to contact Teresa S. Smith at tssmithe@ohionet.org. This project has been approved by Kent State University; if you have questions about Kent State University's rules for research, please call the Office of Research and Sponsored Programs at 216-672-2070, or the advisor Dr. Lois Buttlar at 216-672-2782.

If you wish to respond to the survey, please complete the questionnaire at the following URL address: http://ourworld.compuserve.com/homepages/urlsurvey

Thank you for your participation.

Sincerely,

Teresa S. Smith

Graduate Student

Kent State University

APPENDIX B

QUESTIONNAIRE

1. In what kind of library do you work?

1. Academic Library
2. Public Library
3. Special Library
4. Other

2. Are you a librarian (having obtained an M.L.S.) or library paraprofessional?

1. Librarian
2. Library Paraprofessional
3. Other

3. What is your position? (title, subject specialty, etc.)

1. Library Manager/Director
2. Librarian/Information Specialist
3. Reference Assistant/Technician
4. Other

4. How many persons work in your library?

1. One to five
2. Six to ten
3. Eleven to twenty
4. Twenty-one to fifty
5. More than fifty

5. What is your subject specialty?

1. Science/Mathematics/Technology
2. Business/Finance
3. Medicine/Health
4. Social/Behavioral Sciences
5. Humanities/Art
6. Government/Law
7. General

6. When you attempt to locate information by searching URLs on the Internet, how valuable do you find the information?

1. Not worthwhile
2. Somewhat worthwhile
3. Worthwhile
4. Very worthwhile
5. Extremely worthwhile

7. How much time do you spend on the internet per week?

1. Two hours or less
2. More than two hours but less than four hours
3. More than four hours but less than six hours
4. More than six hours but less than eight hours
5. More than eight hours

8. List URLs that you use most often.

1. Http://
2. Http://
3. Http://

9. On a scale of 1 to 5 evaluate the content and quality of each of the URLS that you have identified. (1 is the lowest score, 5 is the highest score)

	URL #1	URL #2	URL #3
Content	____	____	____
Quality	____	____	____

10. How long have you been using these URLs?

1. Three months or less
2. More than three months but less than six months
3. More than one year but less than two years
4. More than one year but less than two years
5. More than two years

11. Tell why you selected each URL.

URL #1

URL #2

URL #3

12. Are you presently organizing or cataloging a collection of high use URLs?

1. Yes
2. No

13. When will your collection of high rate URLs be developed and available for use?

1. Within three months
2. Within six months
3. Within one year
4. Not planning to maintain a collection of URLs

Thank you very much for your participation.

Teresa S. Smith tssmithe@ohionet.org

APPENDIX C
URL LISTING

Search Engines

URL Address	Content Rating	Quality Rating
http://www.altavista.com	4.3*	4.1*
http://yahoo.com	4.3*	4.0*
http://lycos.com	4.6*	4.4*
http://webcrawler.com	4.5*	3.7*
http://www.infoseek.com	5	5
http://www.search.com	4	3
http://www.opentext.com:8080/	4	4

Libraries

http://www.ucsf.edu	4	4
http://Thorplus.lib.purdue.edu	4.6*	4.4*
http://library.usask.ca/hytelnet	4	3
http://www.un.siu.edu/databases/wrsic/search.html	3	4
http://www.nova.edu.FInter-links/Freference.html	4	4
http://www.scri.fsu.edu/fla-leg/	4	4
http://www.uncg.edufmckeedocuments.html	4	4

http://sage.cc.purdue.edu/Escholz/	4	4
http://urisref.library.cornell.edu/folonref.htm	4.0*	4.5*
http://stauffer.queensu.ca/inforef/tutorials/findart.ftm	4.0*	4.0*
http://cisti.nrc.ca/cisti/cisti.html	5	5
http://pernet/spartus1/liberal.html	3	3
http://sunsite.berkley.edu/Libwb/	4.0*	5.0*
http://lawlib.wuacc.edu	4	4
http://www.ovchin.udc.edu	5	5
http://www.cpl.org	4.7*	5.0*
http://www.law.emory.edu/FEDCTS/	5	5
http://metronet.lib.mi.us/ROCH/rhpl.html	5	5
http://www.nwrel.org/school_house	5	5
http://ala.org	3	3
http://www.ithaca.edu/library/HTMLs/BUSINESS.html	5	5
http://www.ipl.org	5	5
http://www.cas.usf.edu/english/walker/mla.html	4	4
http://www.mbl.edu/html/LIBRARY/libweb.html	5	4
http://www.twu.ca	3	4
http://www.refdesk.com main.html	4	5
http://ahip.getty.edu/aka/aka_form_pub.html	4	4
http://www.lib.umich.edu/libhome/ArtArch.lib/arch.html	4.5*	3.3*
http://hml.org/www/journals.html	4	3
http://persona.www.media.mit.edu/Postcards/	5	5
http://www.library.miami.edu	5	5
http://www.fit.edu	5	4

Government Sites

http://www.irs.ustreas.gov/	2	3
http://www.acc.gpo.gov/su_docs/	2	4
http://www.census.gov/	3.6*	3.4*
http://www.USPTO.gov	3	5
http://www.mcs.anl.gov	4	5
http://www/epa.gov	4.5*	4.5*
http://lcweb.loc.gov/global/html.html	5	5
http://www.law.vill.edu/Fed-Agency/fedwebloc.html	4.3*	4.0*
http://www.stat-usa.gov/	4	4
http://www.fedworld.gov	5*	5*
http://www.acess.gpo.govsu_docsFacesFaces002	3.5*	3.5*
http://canada.gc.ca/	4	4
http://thomas.loc.gov/	5.0*	4.8*
http://www.sec.gov	4	4
http://unixg.ubc.ca/Fweb-indexes.htl	5	5
http://law.house.gov	5	5
http://www.wunderground.com	5.0*	5.0*
http://www.lerc.nasa.gov/Other-groups/Techlib/home.html	5	5
http://www.sti.nasa.gov	4	3
http://www.sba.gov	4	4
http://www.niss.ac.uk	4	5
http://gopher://gopher.nih.gov:70/11/clin/cancernet	5	5

Commercial Ventures

http://www.netcom.com	4	4
http://switchboard.com	5	5
http://www.pls.com:7001	3	5
http://www/cnnfn.com/	5.0*	5.0*
http://www.petersons.com	3	4
http://rmi.com/awwa/index.html	5	5
http://nytsyn.com/med	5	5
http://home.netscape.com/home/internet-search.html	5	5
http://chronicle.com	4	4
http://nlightn.com/	5	5
http://elsevier.nl/cas/estoc	4	4
http://www.nbia.org	5	4
http://update.wsj.com	3	4
http://www.hoovers.com	5	5
http://www.nando.net	4	4
http://home.texoma.com/mirror/tucows/software.html	4	4
http://www.ref.oclc.org	5	5
http://www.ei.org	5	5
http://www.directory.net	4	5
http://www.ibmlink.ibm.com	4	4
http://www.dejanews.com	4	3
http://info.ca.org/supp.html	3	3

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